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NOTES ON THE NOTONECTIDÆ OF THE VICINITY OF NEW YORK.

BY J. R. DE LA TORRE BUENO.

In the spring of this year (1902) chance led me to attempt the breeding of Notonectas, and since that time I have collected them all through the summer in this vicinity, principally on Staten Island. On two occasions I collected in Van Cortlandt Park; and in the spring I got a good deal of material in the lake at 100th Street, in Central Park. In working up this material, I found that I had all the described species that occur in the East, with one exception.

In the genera *Plea* and *Anisops*, I collected what, because of locality, I take to be the only species found here; namely, *Plea striola* and *Anisops platynemis*. As far as records go, *striola* appears to be the only species of *Plea* found in the United States, but it would seem to me that careful collecting and study would in all probability result in the addition of species to the list in this and the next genus. In *Anisops*, Uhler gives only one species as found in the Atlantic States, that being *platynemis*.

The genus *Notonecta* is represented by *insulata*, *undulata* in three color-varieties; *variabilis*, and *irrorata*. I also took on Staten Island one specimen which does not very well fit in anywhere and may be an aberrant *undulata*, or a new species. This requires further study.

The analytical tables are adapted and the descriptions (except those of *Plea* and *Anisops*) taken from Mr. G. W. Kirkaldy's "Revision of the Notonectidæ," according to which I have made all my determinations.

For the proper understanding of the descriptions and tables, three terms must be explained. Kirkaldy says in his paper mentioned: "That portion of the head which is apparent from a dorsal aspect is named the notocephalon; it is more or less constricted close to the base, this constriction, here termed the synthlipsis, being of great convenience for diagnostic purposes. The imaginary anterior margin of the notocephalon is called the vertex."

ANALYTICAL TABLES.

Family NOTONECTIDÆ.

Beak 3-4-jointed; antennæ 4-jointed; first pair of legs inserted on the posterior margin of the pronotum; scutellum large.

CHARACTERS OF SUB-FAMILIES.

1 (2) Hind tibiæ and tarsi ciliated; abdomen with keel, hairy; eyes very large, conspicuous.....**Notonectinæ.**

2 (1) Hind tibiæ and tarsi not ciliated; abdomen neither keeled nor hairy. Rostrum 3-jointed; eyes small, inconspicuous.....**Pleinæ.**

Sub-Family NOTONECTINÆ.

Genera.

Eyes not contiguous at base, posterior femora not reaching the apex of the hemelytra.

Pronotum not exceedingly transverse; wings present; hemelytral area distinct.

1 (2) Last segment of the antennæ much shorter than penultimate; hind tarsi without claws.....**Notonecta** Linn.

2 (1) Last segment of the antennæ much longer than the penultimate. Hind tarsi with claws.....**Anisops** Spin.

Genus NOTONECTA.

Species.

1 (2-3) Base of the pronotum twice its length; sometimes only one and one half times as long. (In the majority, twice as long.) Scutellum slightly shorter than metanotum.

2 (3) Vertex five times the width of the synthlipsis.....**uhleri** Kirk.

3 (2) Vertex less than five times as wide as synthlipsis.

4 (5) Lateral margins of the notocephalon nearly straight and nearly parallel.

Length of body not less than 13 mm. Dorsum abdominis more or less red.

insulata W. Kirby.

5 (4) Lateral margins of the notocephalon more or less curved, not at all parallel.

6 (8-10) Large robust species more than 12.5 mm. long.

7 (9) Vertex at least three times as wide as synthlipsis.

Head short, eyes somewhat large, lateral margins of the pronotum not quite straight.....**irrorata** Uhler.

8 (6-10) Small species, less than 12 mm. long.

Pronotum twice or nearly twice as wide as long.....**variabilis** Fieber.

9 (7) Vertex less than two and one half times as wide as synthlipsis.

10 (6-8) Small species, subrobust.

Base of the pronotum nearly straight.....**undulata** Say.

Plea striola Fieb.

Head large, wider than pronotum. Eyes small and set far apart.

Pronotum and metanotum fused, large, about four times as large as head, and overlapped at the base by the hemelytra.

Hemelytra coriaceous throughout, with no distinction of cells; reticulated and with a setigerous puncture in each reticulation from which springs a long fine seta. Strongly convex, making the body thicker through than the width. Alæ absent. Pedes all provided with claws; posterior tibiæ and tarsi furnished with sparse, scarcely noticeable, swimming ciliæ.

Venter abdominis without a keel ; connexivum sparsely ciliated.

Color throughout bruno-testaceous, ranging in shade. Length, 2-2.4 mm. ; width, 1.1-1.2 mm. ; height, 1.3 mm.

This interesting little species I first found in Van Cortlandt Park, on September 13 of this year. I discovered it in washing the copious rootlets of a species of Duckweed, and took it at first to be a very large *Daphnia*. On looking more closely, I saw it assume the typical notonectid position, abdomen up, its extremity at the surface. Later in the season, toward the end of October, in company with Mr. W. T. Davis, we found it in Cape Henlopen Pond in Staten Island.

Two of the Pleas are now living in a covered glass with some *Nitella* to aërate the water, together with an agrionid nymph and an ephemerid nymph. To feed them there are plenty of water fleas. I have not seen the Pleas eat these, nor is their number apparently diminished, and from observations I am inclined to believe that they are vegetable feeders. I cannot, however, assert positively the nature of their food. Their favorite position seems to be clinging to the underside of the duckweed leaves. They rarely swim, apparently preferring to creep along the stems of the aquatic plants, on which at times they rest, clasping them with the legs. When they do swim, they move through the water by means of a rather rapid, clipping stroke.

When living and seen in the water, by means of a one-half-inch lens, the hairs arising from the punctures on the hemelytra, can be seen standing out ray-like, the punctures themselves being noticeable. Because of the highly convex dorsum, homogeneous character of the hemelytra and their habit of creeping along the stems of the water-plants, they might at a cursory glance be taken for small aquatic beetles.

Those I have collected were found along the edges, among the fine roots of the grasses and the stems of the netted water weeds, and from the habit of creeping noted, it might seem that this is their favorite habitat.

The places mentioned are the only localities for it that I know of in this vicinity, but *Plea* should be found anywhere. Uhler in his "Check List" gives this species as being found in the United States. Probably it is not oftener collected on account of its inconspicuous size and retiring habits.

***Notonecta insulata* Kby.**

"Head: notocephalic lateral margins fairly straight and nearly parallel, very slightly constricted near the base ; vertex little wider than synthlipsis, which is about

one fourth less than the width of the base of the eye. Lateral and humeral margins of the pronotum sinuate. *Scutellum* varying slightly in length, but occasionally reaching and usually nearly reaching the base of the metanotum, black. *Hemelytra* variable in pattern and color.

"*Alæ*: basal nervules crimson, the others yellow brown. *Pedes*: coxæ black, intermediate tibial spur small, slender, not tipped with black. *Abdominis dorsum*: segment 1 black, 2-6 brilliant scarlet, 7-8 reddish testaceous. *Abdominis venter* black, connexivum and central carina green. Long., 13-15 mm.; lat., 4.9-5 mm."

Personally, I have not found this species, but Mr. H. G. Barber has taken it in the city, in a rock-hole that was being drained; and Mr. Davis has found it on Staten Island. It might at first glance be taken for *undulata* var. *charon*, but is readily distinguishable from it by the nearly parallel notocephalic margins, the greater size, and the reddish tinge of the hemelytra.

Notonecta undulata Say.

"*Head* diverging curvedly (varying in degree) from the synthipsis, which is about two fifths the width of the vertex. *Pronotum*, humeral margins as a rule not distinct. *Scutellum* not quite one fourth shorter than the metanotum, varying in color from pale luteous to black, with divers intermediate arrangements of the two colors; similar hemelytral markings occurring with dissimilarly marked scutella and vice versa. *Metanotum* varying from luteous to black, with three or more dark castaneous stripes, scutellar margin luteous. *Hemelytra* exceedingly variable, giving rise to a number of well-marked varieties, though these are linked by intermediate forms. Long. 10.2-12.6 mm.; lat. 3.4-4.2 mm."

This species is represented in three varieties in this locality. The pure moonlight-color or very pale greenish-yellow variety, *maculata* Fieb., which occasionally exhibits a few dark markings, grades into the next variety, *undulata* Say. The latter varies from pure ivory-white to pale luteous, with a somewhat greenish-gold tinge in some specimens. It is marked with from a few indefinable brown spots at the base of the membrane to a broadish band, covering the base of the membrane and the apex of the corium. The third variety, *charon* Kirk., resembles the more heavily-marked specimens of the preceding with clouded hemelytra. As a matter of fact, these three varieties merge into each other by insensible gradations, and it is only in a large series that this can be appreciated.

The majority of the light specimens I have were taken in Central Park, from about the middle to the end of March. A few were collected this fall in Staten Island with Mr. Davis. The darker varieties all came from Staten Island and were collected in October and November.

The locality they frequent in the Park (and where they were abundant) is a small lake full of vegetation. I found them among the past year's dead leaves in a little cove which was later massed with vegetation. This place was teeming with agrionid nymphs, which furnished them abundant food.

In Staten Island a few were found in Cape Henlopen pond; they were, however, much more abundant in the vegetation in the rock-pools of an abandoned quarry. The temperature of the water was, of course, low, because of the season, and the insects seemed to be seeking shelter among the vegetation.

The specimens taken in the spring bred in my aquaria, but unfortunately I was unable to take them beyond the third instar. From the size of this nymph and of others that I have collected, it might seem that there are at least five instars, if not six.

This is by far the most common species locally and can be found without any difficulty.

Notonecta variabilis Fieb.

"*Head*: notocephalic lateral margins diverging curvedly from the narrow base, vertex about three times as wide as synthipsis. *Pronotum*: width of posterior margin not quite twice as great as the length of the pronotum. *Hemelytra*: very variable. *Alar* nervures pale golden yellow. *Pedes* and abdomen as in *N. undulata* Say. Long. 8.9 to 10 mm.; lat. 3. to 3.4 mm."

This interesting species I first took on the Palisades, one specimen only. On election day (November 4) of this year, I collected it in large numbers at Van Cortlandt, and found it clinging to the under surface of dead leaves in the water.

It looks very much like a small specimen of *N. undulata* var. *maculata*, but the size and the notocephalon serve to determine it. The largest *variabilis* I have measured is only 10 mm., while the shortest *undulata* var. *maculata* exceeds 11 mm.

This species has also been taken in Staten Island by Mr. Davis and myself.

It is of interest to note that on one specimen of this I found a parasite, fastened to the dorsum of one of the abdominal segments. I shall describe this later.

This species is in part *N. variabilis* Fieb., and is considered by Professor Uhler to be a variety of *undulata*. As stated before, I have accepted Kirkaldy's classification, and on comparison of characters, it would seem to me that his differentiation of species is good.

Notonecta irrorata Uhl.

"*Head* small, notocephalic lateral margins diverging widely, vertex a little more than three times as wide as synthlipsis; width of vertex and of the eye subequal; *eyes* rather larger proportionately than some other species; *pronotum* much wider basally than apically, lateral margins not sinuate, humeral angles acute, humeral and posterior margins sinuate. *Hemelytra* rich black, irrorated (especially on the clavus) with refugent yellow-brown, interior lobe of membrane and apex of exterior lobe smoky. The irrorations vary greatly in different individuals; in some the corium and membrane are almost immaculate, in others the whole of the clavus and corium is irrorated, imparting a checkered appearance, while in others the clavus is rich (almost metallic) yellow-brown with faint distant, narrow black lines. *Alar* nervures brown. *Pedes*: intermediate tibial spur small. *Abdominis dorsum*: first to fifth segments black; sixth, seventh and eighth sordid grayish-brown. *Abdominis venter* black. Long. 13-14 mm.; lat. 4-4.5 mm."

This species has been found in the Park lakes by Mr. E. B. Southwick; Mr. Barber has found it in company with the *insulata* before mentioned; and Mr. Davis and myself on Staten Island. We found it in a pond shaded by trees and surrounded by vegetation, matted with decaying roots; fallen leaves and limbs, and aquatic plants were mixed in the black water. It was fairly abundant there.

This cannot be confused with any of the other local species. Its dark color, small head and chunky shape will at once serve to distinguish it.

Notonecta^{*} uhleri Kirk.

"*Head*: notocephalon in the form of an inverted wine decanter, margins greatly curved, widely diverging toward the vertex, which is six to eight times wider than the synthlipsis at which point the eyes are almost contiguous. *Pronotum*: humeral angles acute, accentuated, lateral margins sinuate, humeral margins little separated from the posterior margin. *Metanotum* dark purple-brown. *Hemelytra* varying from dark brick-red to rich orange yellow; a large, irregular blotch at the base of the corium extending transversely and non-acuminately from the apex of the clavus to the golden-yellow exocorial lateral submargin; membrane dark red-brown, apically black—this tint encroaching more or less basally. *Alar* nervures brown. *Pedes*: coxæ blackish; intermediate tibial spur blunt, subcylindrical. *Abdominis dorsum*: first and second segments rufo-testaceous, deeper marginally, the remainder flavo-testaceous, lurid marginally; this latter tint encroaching inwards more and more apically. *Abdominis venter* rufo-testaceous, densely provided with greenish-black ciliæ. Long. ♂ 11-11.4 mm., ♀ 12 mm.; lat. ♂ 3.5-4 mm., ♀ 4 mm."

This I have no knowledge or record of in this vicinity, but as it occurs in Massachusetts and also in Florida, it may perhaps be found here.

Anisops platycnemis *Fieb.*

Head rather large, with prominent eyes, notocephalic lateral margins slightly diverging from synthlipsis and again converging toward the vertex; to the naked eye, the notocephalon appears of equal width throughout. Pronotum overlapping base of head somewhat pointedly, and terminating in a point at the meeting of the hemelytra. Metanotum completely covered by the hemelytra. Hemelytra pearly, lustrous, varying in color when closed from pure white through a bluish to a blackish tinge, in this respect resembling strongly the shadings of mother-of-pearl. Alar nervures pale; Alæ hyaline. Abdominis dorsum varying from testaceous base and blackish tip to nearly entirely black. Venter black. Pedes testaceous. Long. 6.7-8.1 mm.; lat. 2-2.3 mm.

This species I have taken only in Staten Island with Mr. Davis, where we found it in large numbers in a rock hole in an abandoned trap-rock quarry, on October 25. Its slim, long shape was seen at different depths with its long sweep-like hind legs ready for a swift stroke, floating motionlessly among the algæ. We took a large number of specimens on this occasion and a subsequent one.

This species can be readily distinguished from the local species of the genus *Notonecta* by its rather long and slender shape, its narrow notocephalon with parallel sides separating the large eyes; and by the beautiful pearly luster of the hemelytra, which vary from a pure white to a blackish tinge, according to the color of the dorsum abdominis.

**NOTES ON THE CICINDELIDÆ OF THE PINE
BARRENS OF NEW JERSEY.**

BY CHARLES W. LENG, B.S.

The following notes are prepared from the collecting experiences of Mr. Edw. D. Harris, Mr. William T. Davis and the writer, who have, separately or together, visited the pine barrens in each month from April to October. The point visited has usually been Lakehurst (formerly called Manchester), situated about seven miles south of Lakewood and in the midst of a typical pine barren country, where sand, stunted pines and dwarf oaks are repeated with little variation mile after mile; other excursions have been made to Jamesburg, which is rather on the edge of the pine barren than in its midst, and Brookville, which was selected for its propinquity to the East Plain, the most extremely barren portion of the pine barren. On the East Plain,